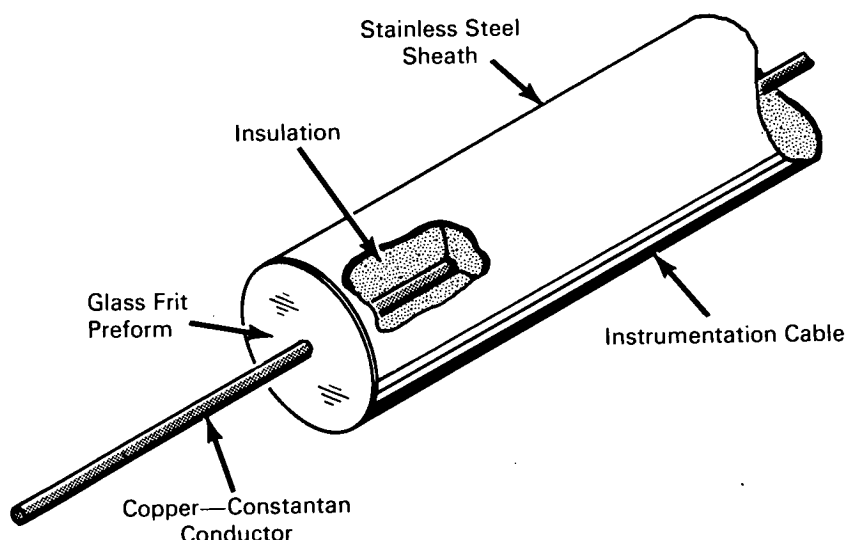


# AEC-NASA TECH BRIEF



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## Glass Formulation Has High Coefficient of Thermal Expansion



### The problem:

To develop a glass that has approximately the same coefficient of expansion as stainless steel and copper. Glass makes a good hermetic seal for the end of a stainless steel or copper tube such as a sheath of an instrumentation cable. The difficulty with ordinary glass is that when heated and melted onto the steel and copper, it cracks upon cooling because of the extreme difference of thermal coefficient of expansion of the materials.

### The solution:

A glass formulation having a high coefficient of thermal expansion.

### How it's done:

A glass frit (type A-508) was developed which has

the required coefficient of expansion of  $13.3 \times 10^{-6}/^{\circ}\text{C}$  between  $25^{\circ}$ – $300^{\circ}\text{C}$ . The chemical composition of this frit by weight percent is:

SiO <sub>2</sub>	— 40.00	MgO	— .50
Al <sub>2</sub> O <sub>3</sub>	— 6.00	ZnO	— 6.00
K <sub>2</sub> O	— 12.00	TiO <sub>2</sub>	— 2.00
Na <sub>2</sub> O	— 8.00	V <sub>2</sub> O <sub>5</sub>	— 6.00
BaO	— 10.00	As <sub>2</sub> O <sub>3</sub>	— .50
SnO	— 2.00	Li <sub>2</sub> O	— 4.00
CaO	— 3.00		

Physical properties of the glass are:

Volume Resistivity	
Temperature	Megohms—cm
24°C	12,100
382°C	2.12

(continued overleaf)

Deformation Temperature 435°C

Sealing Temperature 878°C

Specific Gravity 2.84

**Notes:**

1. An interesting use of this glass formulation is described in Tech Brief B66-10704, "Metal Boot Permits Fabrication of Hermetically Sealed Splices in Metal Sheathed Instrumentation Cables."
2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
AEC-NASA Space Nuclear Propulsion  
Office

U.S. Atomic Energy Commission  
Washington, D.C. 20545T

Reference: B66-10705

**Patent status:**

No patent action is contemplated by AEC or NASA.

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